Texas Technology Showcase

Calpine's Baytown Energy Center – A Cogeneration Overview

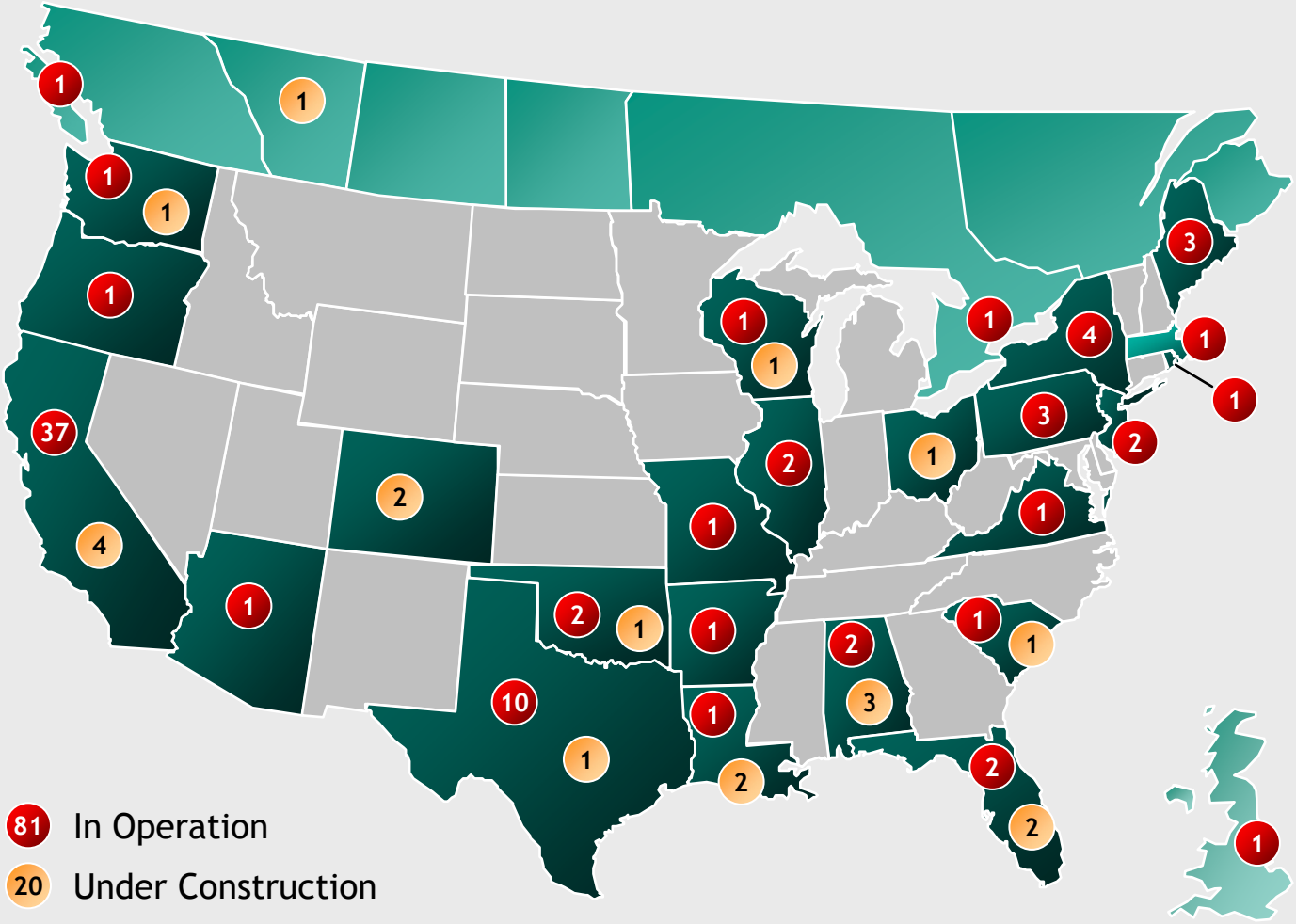
March 18, 2003

CALPINE

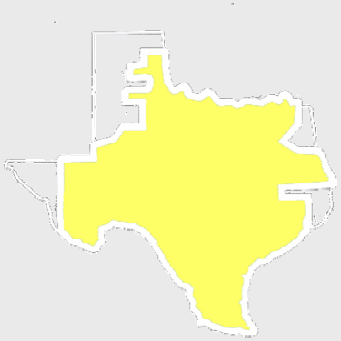
TEXAS TECHNOLOGY SHOWCASE

- Dean Elkins, Director, Industrial Marketing
- Chris Shugart, Manager, Industrial Sales

CALPINE'S POWER PORTFOLIO

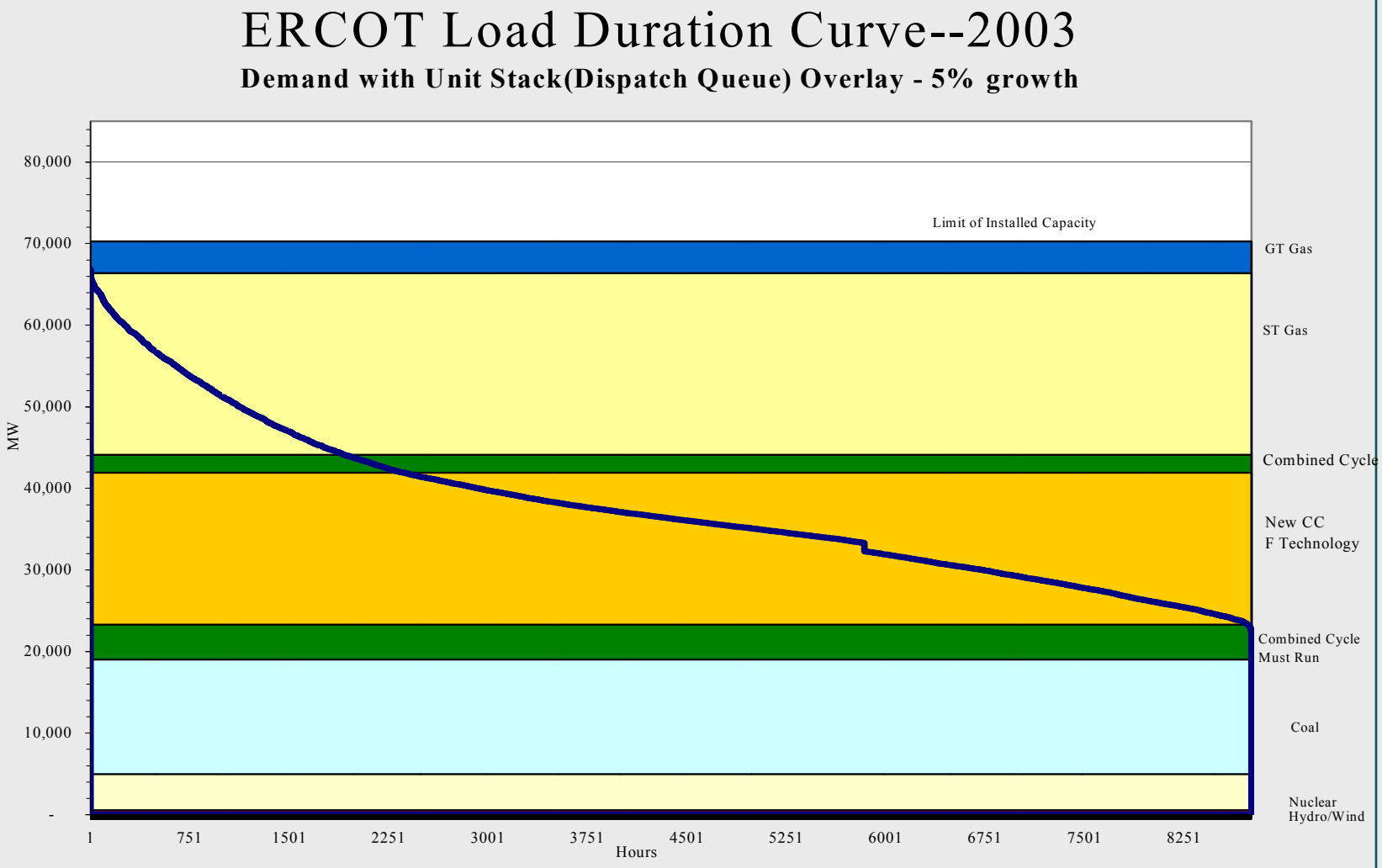


ERCOT MARKET OVERVIEW



- Peak Demand 2002: 57,700 MW
- Installed Capacity: 75,000+ MW
- Approx. 40% capacity gas-fired steam turbines
- Limited Transmission to Other NERC Regions
- Texas Consumes 20% of Industrial Energy in U.S.
- 51% of Energy in Texas by Industrials on Gulf Coast
- Retail Access Began January 1, 2002

ERCOT 2003 Load Duration Curve



BAYTOWN ENERGY CENTER

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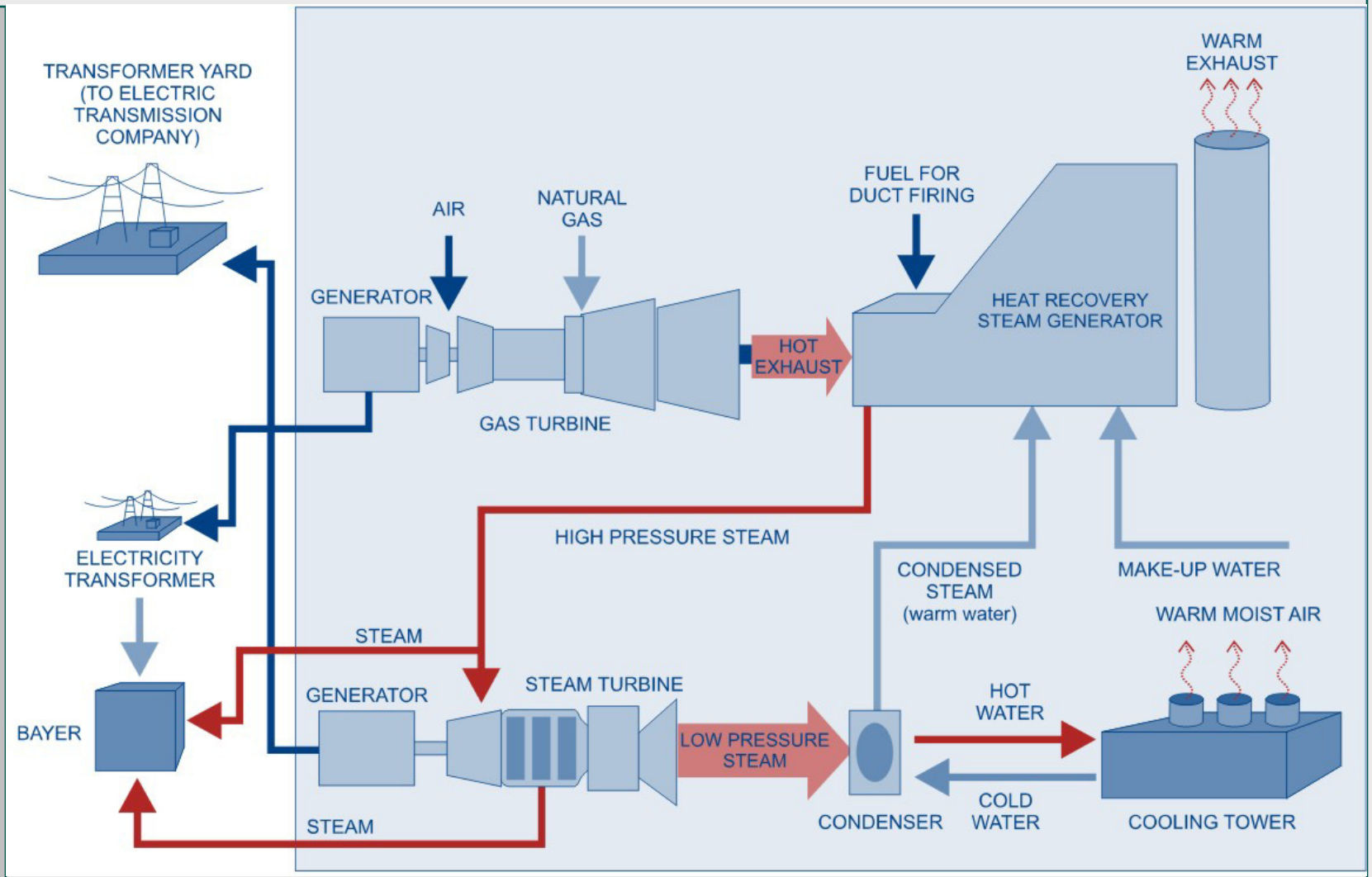
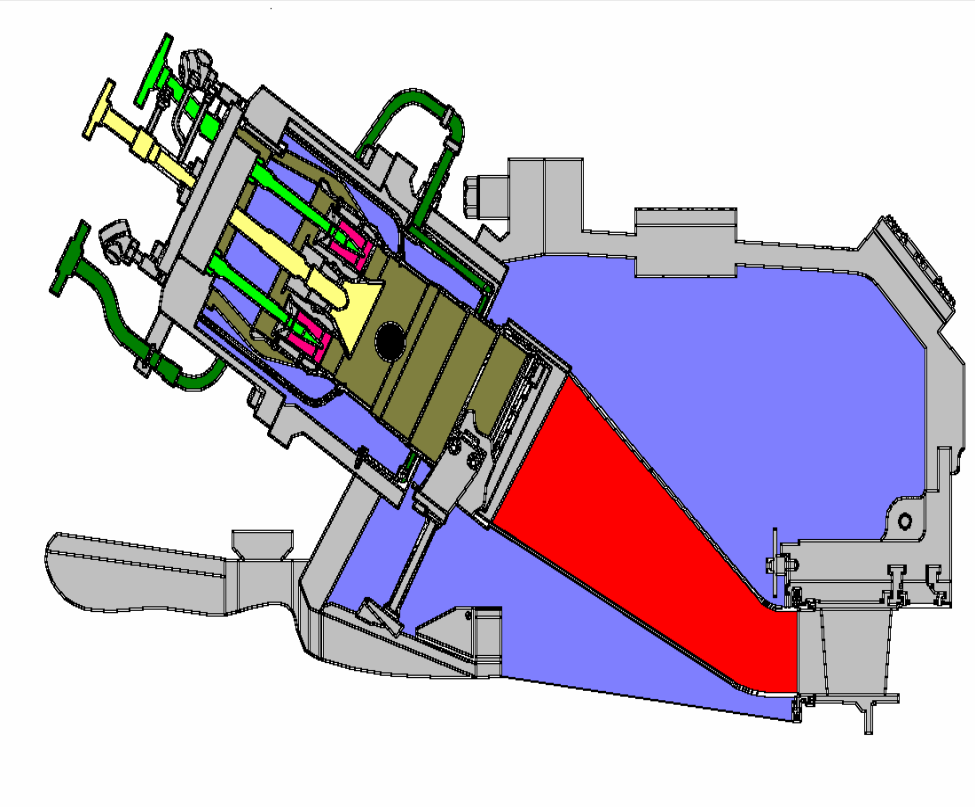
- 3 x 1 Combined Cycle Cogeneration
- Siemens-Westinghouse 501FD Combustion Turbines
- 700 MW Base, 830 MW Peak
- Process Steam Capacity - Over 1,000,000 lb/hr
- 2 x 350 kpph Aux Boilers for Backup
- Dry Low NOx CTG Combustors and SCR in HRSG
- Low NOx burners on Auxiliary Boilers

PROCESS DIAGRAM



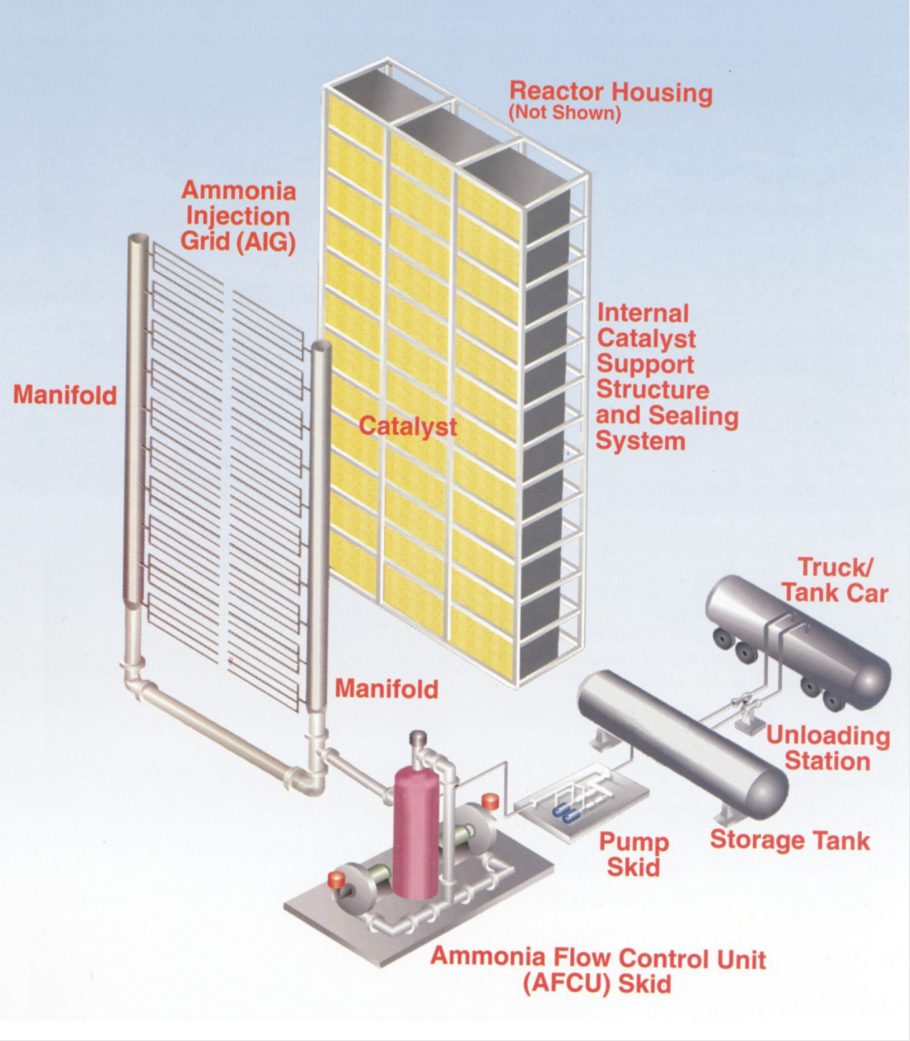
EMISSIONS CONTROL - CTG

CTG Dry Low NOx Combustors



- No steam or water
- 20 – 25 ppm NOx
- Pre-mixing fuel/air
- Ultra-lean
- Combustor Monitoring

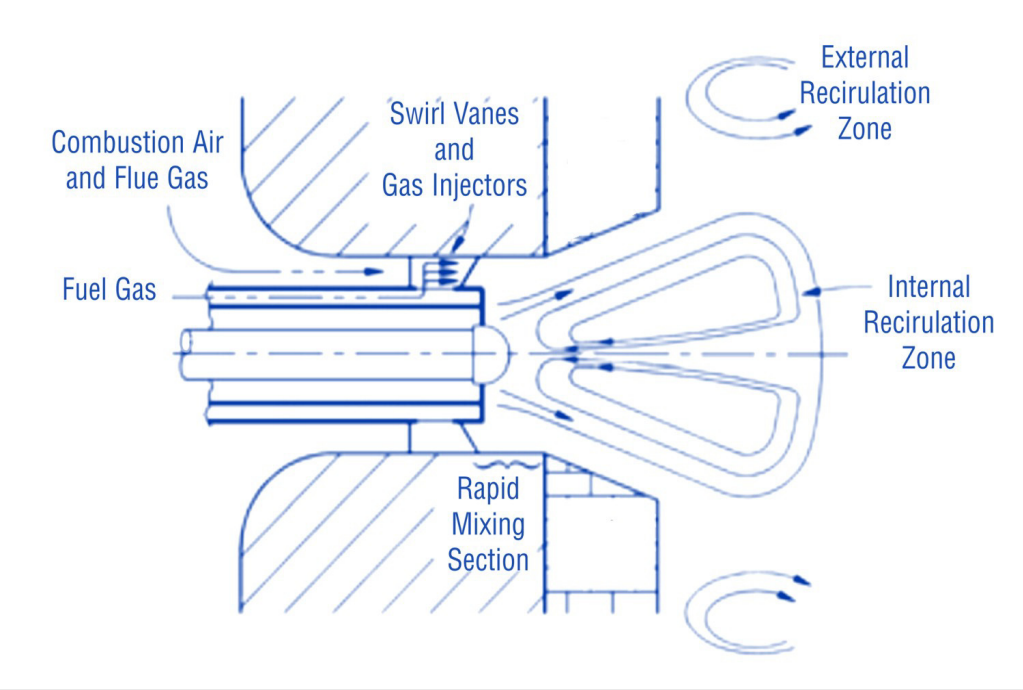
EMISSIONS CONTROL – SCR SYSTEM



- Strategically Located Inside HRSG
- Ammonia Based
- $NH_3 + NO_x \rightarrow N_2 + H_2O$
- <10 ppm Slip
- $(NH_4)_2SO_4$ and H_2SO_4 byproducts

EMISSIONS CONTROL - BURNERS

Auxiliary Boiler Low NOx Combustors

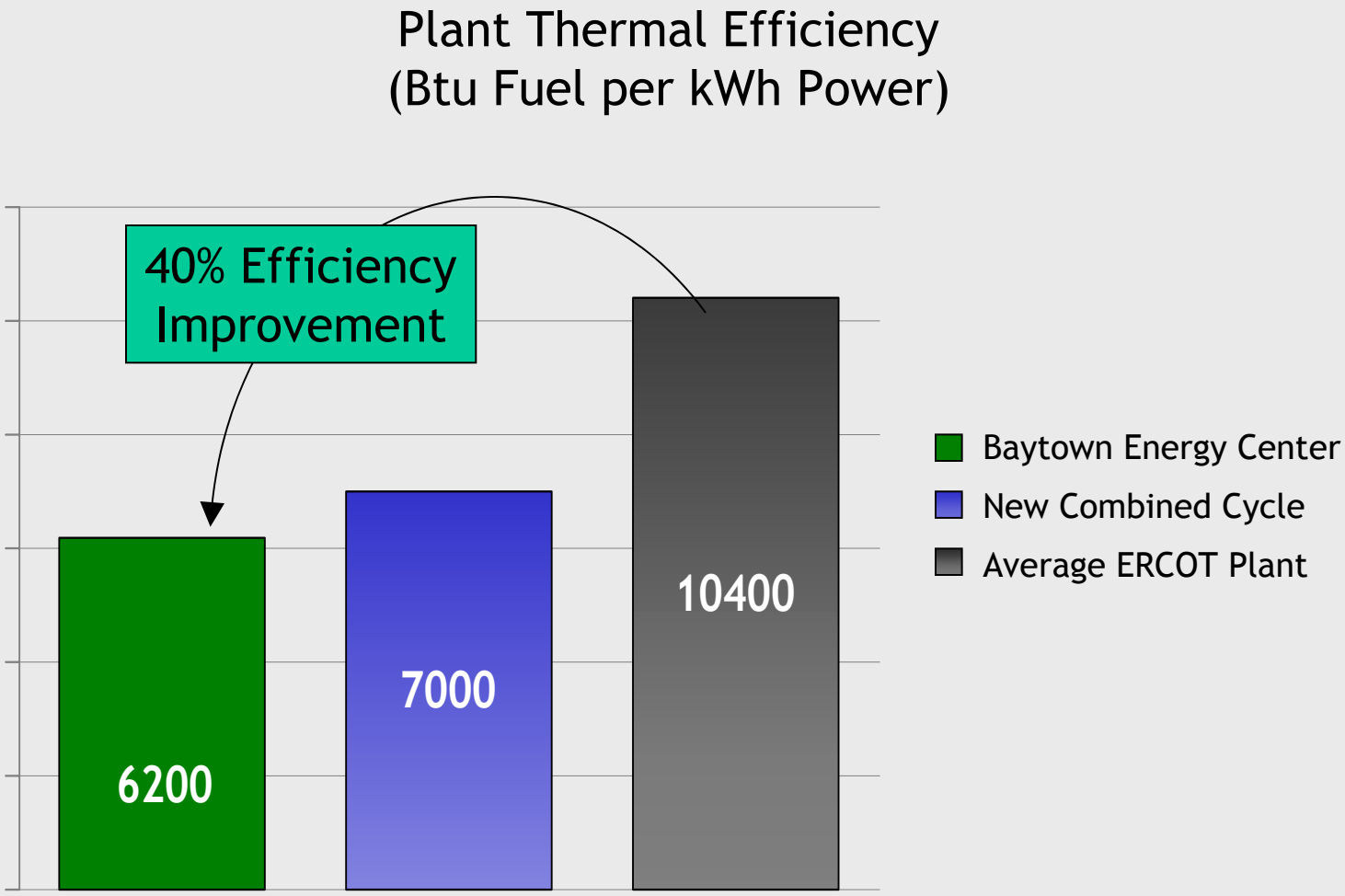


- 9 ppm NOx
- No SCR required
- Rapid fuel/air mix
- Flue Gas Recirculation (FGR)

BAYTOWN ENERGY CENTER

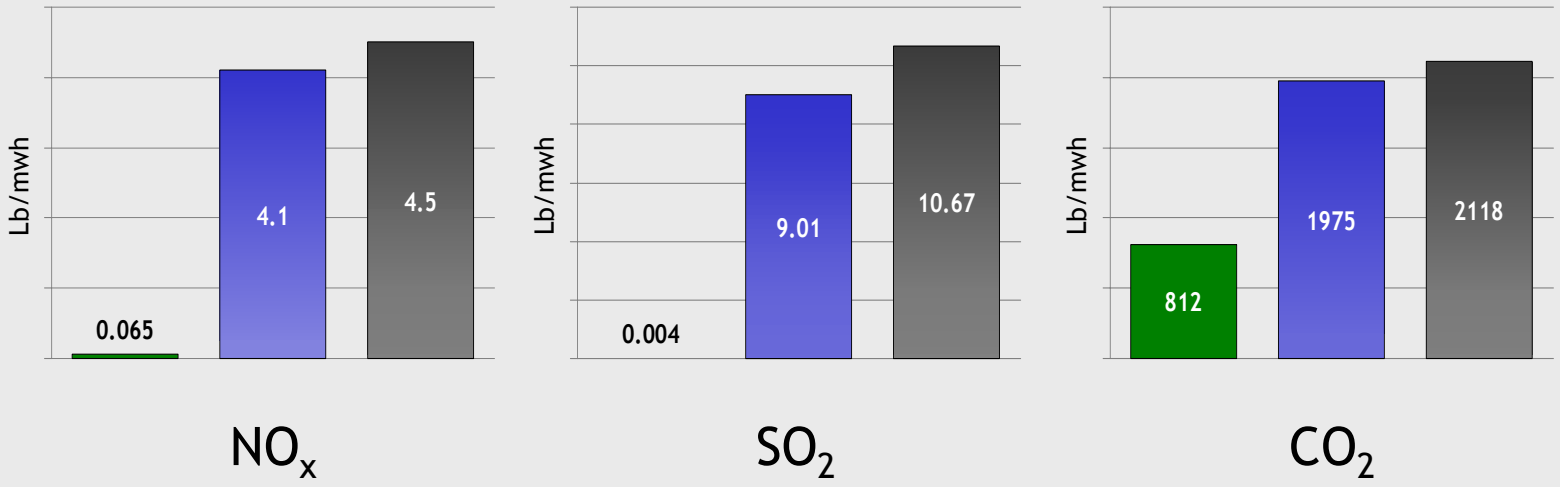
- Public Benefits
  - Reduced Emissions
  - Improved Electrical Efficiency
- Bayer Benefits
  - Emissions Reduction
  - Lower Energy Costs
  - Outsourcing of Utility Operations
- Calpine Benefits – Improved Cogeneration Efficiency

COGENERATION EFFICIENCY



ENVIRONMENTAL PERFORMANCE

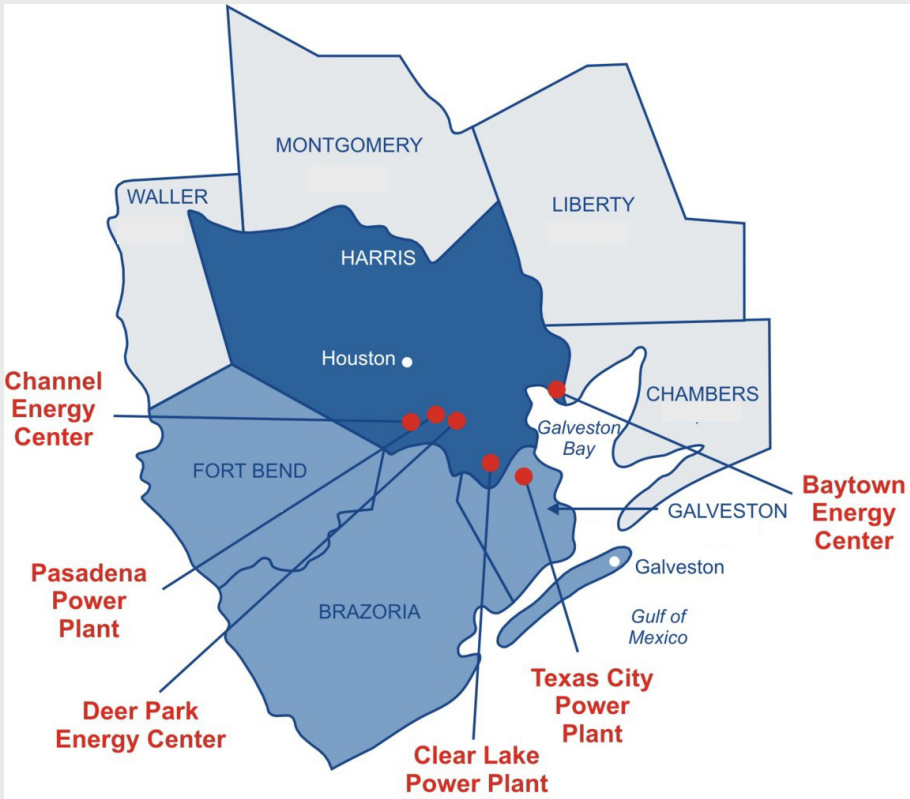
Relative Emission Rates of the Combined Cycle Gas Turbine Technology



2001 EPA Data

ENVIRONMENTAL PERFORMANCE

HGA Non-Attainment Area
Calpine Cogeneration Plants



Potential NOx Reduction: >30,000 tons/yr

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